  
**PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

ATTY DOCKET NO.: 5577-177

DATE: September 10, 1999

**UTILITY PATENT APPLICATION TRANSMITTAL LETTER  
AND FEE TRANSMITTAL FORM (37 CFR 1.53(b))**

BOX PATENT APPLICATION

Assistant Commissioner for Patents

Washington, DC 20231

Sir:

Transmitted herewith for filing under 37 CFR 1.53(b) is:

- ☒ a patent application  
☐ a Continuation ☐ a Divisional ☐ a Continuation-in-Part (CIP)  
of prior application no.: ; filed  
☐ A Small Entity Statement(s) was filed in the prior application; Status still proper and desired.

Inventor(s) or Application Identifier: **Brian T. Webb; Yih-Shin Tan; Yongcheng Li; David B. Gilgen;  
James M. Mathewson, II; Michael Srihari**

Entitled: **METHODS, SYSTEMS, AND COMPUTER PROGRAM PRODUCTS THAT  
REQUEST UPDATED HOST SCREEN INFORMATION FROM HOST SYSTEMS IN  
RESPONSE TO NOTIFICATION BY SERVERS**

Enclosed are:

1. ☒ Application Transmittal Letter and Fee Transmittal Form (*A duplicate is enclosed for fee processing*)
2. ☒ 23 pages of Specification (including 36 claims)
3. ☒ Seven (7) sheets of Formal Drawings (35 USC 113)
4. ☒ Oath or Declaration
  - a. ☒ newly executed (*original or copy*)
  - b. ☐ copy from prior application (37 CFR 1.63(d) (*for continuation/divisional*) [Note Box 5 Below]
  - c. ☐ DELETION OF INVENTOR(S) (*Signed statement deleting inventor(s) named in the prior application*)
5. ☐ Incorporation By Reference (*useable if box 4b is checked*)

The entire disclosure of the prior application, from which a copy of the oath or declaration is supplied under Box 4b, is considered as being part of the disclosure of the accompanying application and is hereby incorporated by reference therein.
6. ☐ Microfiche Computer Program (*Appendix*)
7. ☒ Assignment papers (*cover sheet(s) and document(s)*)
8. ☐ Small Entity Statement(s)
9. ☐ Information Disclosure Statement, PTO-1449, and references cited
10. ☐ Preliminary Amendment (*Please enter all claim amendments prior to calculating the filing fee.*)
11. ☐ English Translation Document
12. ☐ Certified Copy of Application No. ; Filed

13. ☐ Sequence Listing/ Sequence Listing Diskette  
 a. ☐ computer readable copy  
 b. ☐ paper copy  
 c. ☐ statement in support
14. ☐ An Associate Power of Attorney
15. ☒ Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*
16. ☐ Other:

The fee has been calculated as shown below:

	Column 1 No. Filed	Column 2 No. Extra	Small Entity Rate Fee	Large Entity Rate Fee
BASIC FEE			\$380.00	\$760.00
TOTAL CLAIMS	36 - 20 =	16	x 9 = \$	x 18 = \$288.00
INDEP CLAIMS	7 - 3 =	4	x 39 = \$	x 78 = \$312.00
<input type="checkbox"/> MULTIPLE Dependent Claims Presented			+ 130 = \$	+ 260 = \$
<i>If the difference in Col. 1 is less than zero, Enter "0" in Col. 2</i>			Total \$	Total \$1360.00

☐ A check in the amount of \$ \_\_\_\_\_ to cover the filing fee is enclosed.

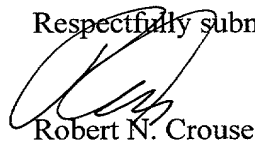
☒ Please charge my Deposit Account No. 09-0461 in the amount of \$1,400.00 to cover the filing fee (\$1,360.00) (this amount includes \$40.00 for Recordation of Assignment).

☒ The Commissioner is hereby authorized to charge payment of the following fees associated with this communication or credit any overpayment to Deposit Account No. 09-0461.

☒ Any additional filing fees required under 37 CFR 1.16.

☒ Any patent application processing fees under 37 CFR 1.17.

Respectfully submitted,



Robert N. Crouse

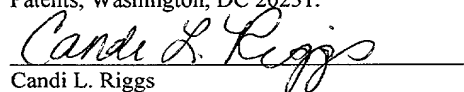
Registration No. P-44,635

Correspondence Address:  
 USPTO Customer Number: **20792**  
 Myers Bigel Sibley & Sajovec, P.A.  
 Post Office Box 37428  
 Raleigh, NC 27627  
 Tel (919) 854-1400  
 Fax (919) 854-1401

# CERTIFICATE OF EXPRESS MAILING

Express Mail Label No. EL085941611US  
 Date of Deposit: September 10, 1999

I hereby certify that this correspondence is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10 on the date indicated above and is addressed to Box Patent Application, Assistant Commissioner For Patents, Washington, DC 20231.



Candi L. Riggs

Date of Signature: September 10, 1999

**METHODS, SYSTEMS, AND COMPUTER PROGRAM PRODUCTS THAT  
REQUEST UPDATED HOST SCREEN INFORMATION FROM HOST  
SYSTEMS IN RESPONSE TO NOTIFICATION BY SERVERS**

**Field of the Invention**

The present invention relates to network computing in general, and more particularly, to the communication between servers and clients.

**Background of the Invention**

5           Some applications that run on legacy host systems can be accessed using a display terminal running a terminal protocol. The terminal protocol may enable communications to and from the display terminal, such as when a screen is transmitted to the display terminal and when user input is transmitted to the host system. Such protocols are sometimes referred to as "2 way asynchronous" communications. In such a terminal protocol, for example, updated (or new) screens generated by the host application may be transmitted to the display terminal without a request from the user. In other words, updated screens may be automatically transmitted to the display terminal.

10           It is also known to provide access to applications running on legacy host systems over a network, using a server running a terminal emulation program. For example, screens generated by host applications traditionally accessed using a display terminal using a terminal protocol may be reformatted by a server terminal emulation program into markup language. The markup language format may then be provided in response to a request from a web browser application. Thus, the use of a server terminal emulation program enables the legacy host system to be accessed using a browser over, for example, the World Wide Web (WWW), the internet or an intranet, rather than a display terminal over a terminal protocol.

20           Unfortunately, some of the communications protocols used to provide terminal emulation between browsers and legacy host systems may not provide the same

communications functions provided by the terminal protocols described above. For example, the Hypertext Transport Protocol (HTTP) utilizes a synchronous "request-response communications model." In HTTP, the server typically only provided information to the browser in response to a request from the browser. In such a system, it may be difficult to provide the asynchronous communications described above. In particular, it may be difficult to provide updated screens to the browser automatically.

Some systems may allow a user to provide manual requests for updated screens to the legacy host system which may cause the server to provide an updated screen generated by the legacy host system. For example, a refresh button may be provided wherein the user may request an updated screen from the legacy host system. In addition to requiring user intervention, this type of solution to the synchronous communications problem may not provide an updated host screen because the refresh request may occur prior to the generation of an updated screen. Accordingly, there is a need for methods, systems, and computer program products that allow improved communication with legacy host applications over the WWW.

### **Summary of the Invention**

It is, therefore, an object of the present invention to allow improved communication between client applications and legacy host applications where a synchronous communication model is used.

It is a further object of the present invention to allow synchronous clients to receive asynchronous communications without requiring user intervention.

These and other objects of the present invention are provided by methods, systems, and computer program products that establish a first connection between a client application and a server application, wherein the server application provides updated host screen information to the client application in response to requests from the client application by establishing a second connection between a monitor application and the server application. A notification of the availability of updated

host screen information is then received via the second connection at the monitor application and a request for updated host screen information is transmitted over the first connection responsive to receiving the notification. The requested updated host screen information is received at the client application and displayed utilizing the client application.

By utilizing an alternate or second connection to the client, the server may notify the client of the availability of host screen information and, thereby, prompt the client to request the host screen information using the first, synchronous, connection. Because client application requests the updated host screen information in response to the notification from the server, the need for the user to manually request updated host screen information may be reduced.

In one embodiment, the monitoring application which monitors the alternate connection for notifications may be relatively small notification code or an applet that is embedded in a web page description (HTML) provided to the client. When executed, the notification code establishes a notification connection to the server. When the notification code receives notification of the availability of updated host screen information, the notification code signals the client application and terminates. Accordingly, the relatively small notification code can be more readily embedded in the HTML description and may reduce the time needed to download the updated host screen information.

As will be appreciated by those of skill in the art, the present invention may be embodied as methods, systems (apparatus) and/or computer program products.

#### **Brief Description of the Drawings**

**FIG. 1** is a block diagram of first embodiment of a system according to the present invention.

**FIG. 2** is a block diagram of a second embodiment of a system according to the present invention.

**FIG. 3** is a block diagram of a third embodiment of a system according to the present invention.

**FIG. 4** is a flowchart that illustrates operations of a system according to the present invention.

5       **FIG. 5** is a flowchart that illustrates operations of a system including downloading of notification code according to the present invention.

**FIG. 6** is a capture of a host screen generated by a host system including host screen information.

10       **FIG. 7** is a capture of a screen rendered by a client application screen including formatted updated host screen information.

### **Detailed Description of the Invention**

15       The present invention now will be described more fully hereinafter with reference to the accompanying drawings, in which preferred embodiments of the invention are shown. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. Like numbers refer to like elements throughout.

20       As will be appreciated by one of skill in the art, the present invention may be embodied as methods, systems or computer program products. Accordingly, the present invention may take the form of an entirely hardware embodiment, an entirely software embodiment or an embodiment combining software and hardware aspects.

25       The present invention is described herein using flowchart illustrations and block diagrams. It will be understood that each block of the block diagrams or flowchart illustrations, and combinations of blocks in the block diagrams or flowchart illustrations, can be implemented by computer program instructions. These program instructions may be provided to a processor(s) within a computer system, such that the instructions which execute on the processor(s) create means for implementing the

functions specified in the block diagrams or flowchart block or blocks. The computer program instructions may be executed by the processor(s) to cause a series of operational steps to be performed by the processor(s) to produce a computer implemented process such that the instructions which execute on the processor(s) provide steps for implementing the functions specified in the block diagrams or flowchart block or blocks.

Accordingly, blocks of the block diagrams or flowchart illustrations support combinations of means for performing the specified functions, combinations of steps for performing the specified functions and program instruction means for performing the specified functions. It will also be understood that each block of the block diagrams or flowchart illustrations, and combinations of blocks in the flowchart illustrations, can be implemented by special purpose hardware-based systems which perform the specified functions or steps, or combinations of special purpose hardware and computer instructions.

The clients and the servers described herein (in whole or in part) may be remote from one another or resident in the same location. The phrase "client application" includes applications, such as browsers, that request information, such as host screens generated by host systems. As used herein the term "terminal emulation" includes any form of user or programmable access and interactions with host screens generated by host systems. Although the present invention is described with reference to terminal emulation, it will be understood that the scope of the present invention includes other systems and services.

**FIG. 1** is a block diagram of a first embodiment of a system according to the present invention. According to **FIG. 1**, a server **110** provides terminal emulation sessions for a client application **115** to a host system **105** that runs legacy host applications. The host system **105** generates output in the form of host datastreams **120** that include host screen information such as tables, paragraphs of data and the like which can appear as part of a host screen **121**. The host datastreams **120**, including host screen information, are transmitted to the server **110**.

During operation, the server **110** receives host screen information from the host system **105**. The host screen information can be generated responsive to a request by the server **110** or responsive to non-server events. For example, the host system **105** can transmit host screen information to the server **110** in response to user input or a change in the status of the host system **105**. Accordingly, the host screen information generated by the host system **105** can update the host screen information previously received by the server **110**. It will be understood that the phrase "updated host screen information" includes host screen information not previously received by the server **110** as well as host screen information previously received by the server **110**. For example, when the server **110** receives host screen information previously received by the server **110**, the host screen information provided by the host system **105** represents updated host screen information.

When the server **110** receives updated host screen information, an Application Programming Interface (API) **135** generates a message which is used to notify the client application **115** that the server **110** has received updated host screen information. The notification is transmitted to the client application **115** over a notification connection **122** from a first server socket **117** to a first client socket **119**. The API can be Extended High Level Language API, Host Access Class Library, Open Host Interface Objects, or the like.

The server **110** receives requests for updated screen information from the client application **115** via a request connection **124**. It will be understood to those having skill in the art that the request connection **124** may be, for example, the HTTP connection and can carry information according to the response-request communication model. It will be understood that, the server can be a mid-tier WWW server that conducts terminal emulation sessions for multiple client applications **115** running on respective client workstations.

A connection can be provided by a communications protocol, such as Transmission Control Protocol/Internet Protocol (TCP/IP). A connection between applications can be accessed using sockets. For example, according to **FIG. 1**, the



API **135** accesses the first connection **122** to the client application **115** via the first server socket **117**. The client application **115** accesses the first connection **122** via the first client socket **119**. The notification connection **122** and the request connection **124** can be provided over separate communications links or a single communications link, such as a modem.

An application **130** running on the server **110** formats the updated host screen information as web page descriptions using Host On Demand (HOD) functions to generate a markup language format, such as Extensible Markup Language (XML) or Hypertext Markup Language (HTML) for the updated host screen information. The formatted updated host screen information (*e.g.*, a web page description) is transmitted to the client application **115** over the request connection **124** from a second server socket **127** to a second client socket **125**. HOD functions and reformatting of updated host screen information are discussed, for example, in U.S. Patent Application No. 09/353218 filed July 14, 1999, entitled *Methods, Systems, and Computer Program Products For Applying Styles to Host Screens Based on Host Screen Content* which is assigned to the assignee of the present application and which is incorporated herein by reference in its entirety.

The client application **115** displays the formatted updated host screen information as a web page **145**. The formatted updated host information can include notification code **140** or application, such as a Java® applet, which can be invoked by the client application **115**. For example, the server **110** can embed the notification code **140** in the formatted updated host information. When the formatted updated host information is received, the client application **115** recognizes the embedded notification code **140** and runs it. Alternately, the formatted updated host screen information includes a reference locator, such as a Uniform Resource Locator (URL) which can be used to locate and download the referenced notification code **140**. The client application **115** can be a web browser, such as Netscape Navigator® marketed by Netscape Communications Corporation based in Mountain View, California.

The client application **115** can run on a client workstation which is not shown. The client workstation can be an input device with a display such as a computer terminal running the client application **115**, a personal computer, a networked computer, a smart phone, a personal digital assistant, a handheld computer, or the like.

5 In operation, the notification code **140** establishes the notification connection by initializing the first client socket **119** to the first connection **122** and waits for a notification from the server **110** over the notification connection **122**. The notification from the server **110** indicates that the server **110** has received updated host screen information associated with a terminal emulation session conducted for the client  
10 application **115**. The notification code **140** transmits a request for formatted updated host screen information to the server **110** over the request connection **124**. According to the present invention, the request for the updated host screen information via the request connection **124** is responsive to the notification from the server via the notification connection **122**.

15 **FIG. 2** is a block diagram of a second embodiment of a system according to the present invention wherein the server **110** provides terminal emulation session applications **130a-c** for a plurality of respective client applications **115a-c**. Each application **130a-c** identifies the requests received from the respective client application **115a-c**. In particular, Identifiers (IDs) are associated with requests made  
20 by each client **115a-c**. For example, the ID included in a first request from the first client application **115a** for updated host screen information identifies the first client application **115a**, a second request from the second client application **115b** for updated host screen information identifies the second client application **105c**, and a third request from the third client application **115c** for updated host screen  
25 information identifies the third client application **115c**. Accordingly, the respective application **130a-c** can transmit the formatted updated host screen information to the appropriate client application **115a-c**.

**FIG. 3** is a block diagram of a third embodiment of a system according to the present invention. According to **FIG. 3**, paging messages are issued to the host

system **105**. The paging messages can include page information such as telephone numbers, text information, audio information, display information, or the like. The page information is transmitted to the server **110** which notifies the notification code **140** via the request connection **122**. The client application **115** requests the page information from the server **110** over the request connection **124** in response to the notification. The server **110** transmits the page information to the client application **115** which can provide the page information to the user.

**FIG. 4** is a flowchart that illustrates operations of a system according to the present invention. According to **FIG. 4**, the request connection **124** is established between the client application **115** and the server **110** (block **405**). The server **110** provides formatted updated host screen information to the client application **115** over the request connection **124** in response to requests from the client application **115**. The notification connection **122** is established between the notification code **140** and the server **110** (block **410**). The notification code **140** monitors communications from the server **110** over the notification connection **122**.

The server **110** receives updated host screen information from the host system **105** and notifies the client application **115** of the availability of the updated host screen information via the notification connection **122** (block **415**). For example, the server **110** can transmit a message via the notification connection **122** to the notification code **140**. Upon receiving the notification of available updated host screen information, the client application **115** transmits a request for the formatted updated host screen information to the server **110** (block **420**) via the request connection **124**. The server **110** responds to the request by transmitting the formatted updated host screen information to the client application **115** via the request connection **140**. The formatted updated host screen information is received by the client application **115** (block **425**) and displayed (block **430**).

**FIG. 5** is a flowchart that illustrates operations of a system including downloading of notification codes according to the present invention. According to **FIG. 5**, the server **110** initializes the first server socket **117** of the notification

connection **122** (block **505**). Formatted updated host screen information (web page) is downloaded from the server **110** to the client application **115** over the request connection **124** (block **510**). The formatted updated host screen information includes a notification code **140** which can be run by the client application **115**.

5           The notification code **140** initializes the first client socket **119**, establishing the notification connection **122** between the server **110** and the notification code **140** and blocks on a read of the first client socket **119** (block **515**). In other words, the notification code **140** continues to wait for a message to be received from the server **110** over the notification connection **122**.

10           When the server **110** receives updated host screen information from the host system **105** (block **525**), the server **110** transmits a notification message to the notification code **140** over the notification connection (block **530**). The notification code **140** receives the notification message and signals the client application **115**. The notification code **140** may then terminate.

15           The client application **115** requests formatted updated host screen information from the server **110** (block **535**) in response to the notification message, whereupon the server **110** transmits the formatted updated host screen information received from the host system **105** (block **540**). The formatted updated host screen information includes another notification code **140** which initializes the first client socket **119** of the  
20           notification connection **122** between the server **110** and the client application (block **515**).

          A detailed example of operations of the present invention will now be described in reference to **FIGs. 6** and **7**. After establishing the request and notification connections **122**, **124** the host screen **121**, including host screen  
25           information, shown in **FIG. 6** is generated by the host system **105**. The server **110** notifies the notification code **140** of the availability of updated hosts screen information over the notification connection **122**.

5

10

15

20

25

30

35

11

5           <input type="text" value="" length="1" maxlength="1">  
          </TD>  
          <TD>  
          Reg  
          </TD>  
          <TD>  
          <FONT COLOR="#00FFFF">4095</FONT>  
          </TD>  
          <TD>  
10          IBMUSM  
          </TD>  
          </TR>

15           The notification code **140**, or a reference thereto, is included in the HTML  
description. For example, a reference to the notification code **140** can be expressed  
as:

20           <HTML>  
          ...  
          HTML description of updated host screen information  
          ...  
          <Applet Code = "MyClass.class">  
25           <HTML>

30           The HTML description of the updated host screen information is downloaded  
to the client application **115**. The client application examines the HTML description,  
recognizes the reference to the notification code " *MyClass.class*", accesses the  
notification code **140**, runs the notification code **140**, and renders the formatted  
updated host screen information as shown in **FIG. 7**. The notification code **140**  
initializes the first client socket **119** and waits for a new notification of available  
updated host screen information over the notification connection **122**.

35           In the drawings and specification, there have been disclosed typical preferred  
embodiments of the invention and, although specific terms are employed, they are  
used in a generic and descriptive sense only and not for purposes of limitation, the  
scope of the invention being set forth in the following claims.

**What is Claimed is:**

1. A method of providing updated host screen information to a client application, the client application utilizing a request-response communications model, the method comprising:

establishing a first connection between the client application and a server application, wherein the server application provides updated host screen information to the client application in response to requests from the client application;

establishing a second connection between a monitor application and the server application;

receiving a notification of the availability of updated host screen information via the second connection at the monitor application;

requesting the updated host screen information over the first connection responsive to receiving the notification;

receiving the requested updated host screen information at the client application; and

displaying the received updated host screen information utilizing the client application.

2. The method of Claim 1, wherein the client application comprises a web browser and wherein the monitoring application comprises notification code.

3. The method of Claim 2, wherein the notification code is provided with updated host screen information, the method further comprising the steps of:

extracting the notification code from the host screen information; and  
executing the notification code.

4. The method of Claim 2, wherein the updated host screen information comprises a Markup Language.

5. The method of Claim 1, wherein the host information comprises terminal emulation information.

6. The method of Claim 1, wherein the first and second connections are conducted via a single communications link.

7. The method of Claim 1, wherein the server application provides updated host screen information to a second client application in response to requests from the second client application, the method further comprising:

5 identifying the client application that requested the updated host screen information.

8. A method of providing updated host screen information to a client application, the client application utilizing a request-response communications model, the method comprising:

5 establishing a first connection between the client application and a server application, wherein the server application provides updated host screen information to the client application in response to requests from the client application;

establishing a second connection between a monitoring application and the server application;

10 receiving updated host screen information from a host system;  
transmitting a notification of the availability of updated host screen information to the monitoring application over the second connection responsive to receiving the updated host screen information;

receiving a request for the updated host screen information from the client application over the first connection; and

15 transmitting the received updated host screen information to the client application over the first connection in response to receiving the request for the updated host screen information from the client application.



9. The method of Claim 8, wherein the client application comprises a web browser and wherein the monitoring application comprises an notification code.

10. The method of Claim 9, wherein the step of transmitting the received updated host screen information further comprises the step of incorporating the notification code in the updated host screen information transmitted to the client application.

11. The method of Claim 8, wherein the server application provides updated host screen information to a second client application in response to requests from the second client application, the method further comprising:

identifying the client application that requested the updated host screen information.

12. A system of providing updated host screen information to a client application, the client application utilizing a request-response communications model, the system comprising:

means for establishing a first connection between the client application and a server application, wherein the server application provides updated host screen information to the client application in response to requests from the client application;

means for establishing a second connection between a monitor application and the server application;

means for receiving a notification of the availability of updated host screen information via the second connection at the monitor application;

means for requesting the updated host screen information over the first connection responsive to receiving the notification;

means for receiving the requested updated host screen information at the client application; and

means for displaying the received updated host screen information utilizing the client application.

13. The system of Claim 12, wherein the client application comprises a web browser and wherein the monitoring application comprises an notification code.

14. The system of Claim 13, wherein the notification code is provided with updated host screen information, the system further comprising:

means for extracting the notification code from the host screen information;

and

means for executing the notification code.

15. The system of Claim 13, wherein the updated host screen information comprises a Markup Language.

16. The system of Claim 12, wherein the host information comprises terminal emulation information.

17. The system of Claim 12, wherein the first and second connections are conducted via a single communications link.

18. The system of Claim 12, wherein the server application provides updated host screen information to a second client application in response to requests from the second client application, the system further comprising:

means for identifying the client application that requested the updated host screen information.

19. A system of providing updated host screen information to a client application, the client application utilizing a request-response communications model, the system comprising:

5 means for establishing a first connection between the client application and a server application, wherein the server application provides updated host screen information to the client application in response to requests from the client application;

means for establishing a second connection between a monitoring application and the server application;

10 means for receiving updated host screen information from a host system;

means for transmitting a notification of the availability of updated host screen information to the monitoring application over the second connection responsive to receiving the updated host screen information;

15 means for receiving a request for the updated host screen information from the client application over the first connection; and

means for transmitting the received updated host screen information to the client application over the first connection in response to receiving the request for the updated host screen information from the client application.

20. The system of Claim 19, wherein the client application comprises a web browser and wherein the monitoring application comprises an notification code.

21. The system of Claim 20, wherein the means for transmitting the received updated host screen information further comprises means for incorporating the notification code in the updated host screen information transmitted to the client application.

22. The system of Claim 19, wherein the server application provides updated host screen information to a second client application in response to requests from the second client application, the system comprising:

means for identifying the client application that requested the updated host screen information.

23. A computer program product that provides updated host screen information to a client application, the client application utilizing a request-response communications model, the computer program product comprising:

a computer-readable storage medium having computer-readable program code means embodied in said medium, said computer-readable program code means comprising:

computer readable program code means for establishing a first connection between the client application and a server application, wherein the server application provides updated host screen information to the client application in response to requests from the client application;

computer readable program code means for establishing a second connection between a monitor application and the server application;

computer readable program code means for receiving a notification of the availability of updated host screen information via the second connection at the monitor application;

computer readable program code means for requesting the updated host screen information over the first connection responsive to receiving the notification;

computer readable program code means for receiving the requested updated host screen information at the client application; and

computer readable program code means for displaying the received updated host screen information utilizing the client application.

24. The computer program product of Claim 23, wherein the client application comprises a web browser and wherein the monitoring application comprises an notification code.

25. The computer program product of Claim 24, wherein the notification code is provided with updated host screen information, the computer program product further comprising:

computer readable program code means for extracting the notification code from the host screen information; and

computer readable program code means for executing the notification code..

26. The computer program product of Claim 24, wherein the updated host screen information comprises a Markup Language.

27. The computer program product of Claim 23, wherein the host information comprises terminal emulation information.

28. The computer program product of Claim 23, wherein the first and second connections are conducted via a single communications link.

29. The computer program product of Claim 23, wherein the server application provides updated host screen information to a second client application in response to requests from the second client application, the computer program product further comprising:

computer readable program code means for identifying the client application that requested the updated host screen information.

30. A computer program product of providing updated host screen information to a client application, the client application utilizing a request-response communications model, the computer program product comprising:

a computer-readable storage medium having computer-readable program code means embodied in said medium, said computer-readable program code means comprising:

computer readable program code means for establishing a first connection between the client application and a server application, wherein the server application provides updated host screen information to the client application in response to requests from the client application;

computer readable program code means for establishing a second connection between a monitoring application and the server application;

computer readable program code means for receiving updated host screen information from a host system;

computer readable program code means for transmitting a notification of the availability of updated host screen information to the monitoring application over the second connection responsive to receiving the updated host screen information;

computer readable program code means for receiving a request for the updated host screen information from the client application over the first connection; and

computer readable program code means for transmitting the received updated host screen information to the client application over the first connection in response to receiving the request for the updated host screen information from the client application.

31. The computer program product of Claim 30, wherein the client application comprises a web browser and wherein the monitoring application comprises an notification code.

32. The computer program product of Claim 31, wherein the computer readable program code means for transmitting the received updated host screen information further comprises:

computer readable program code means for incorporating the notification code in the updated host screen information transmitted to the client application.

33. The computer program product of Claim 30, wherein the server application provides updated host screen information to a second client application in response to requests from the second client application, the computer program product comprising:

computer readable program code means for identifying the client application that requested the updated host screen information.

34. A system for displaying updated host screen information utilizing a web browser, comprising:

a host server application;

a browser application configured to communicate with the host server application;

a first connection configured to provide communication between the host server application and the browser application;

a notification application operably associated with the browser application that notifies the browser application to request updated host screen information from the host server application for display by the browser application; and

a second connection, established by the notification application code, configured to provide communication between the host server application and the notification application.

35. A system according to Claim 34, wherein the first and second connections comprise sockets.

36. A system according to Claim 34, wherein the notification application is embedded in a web page provided to the browser application by the host server application.

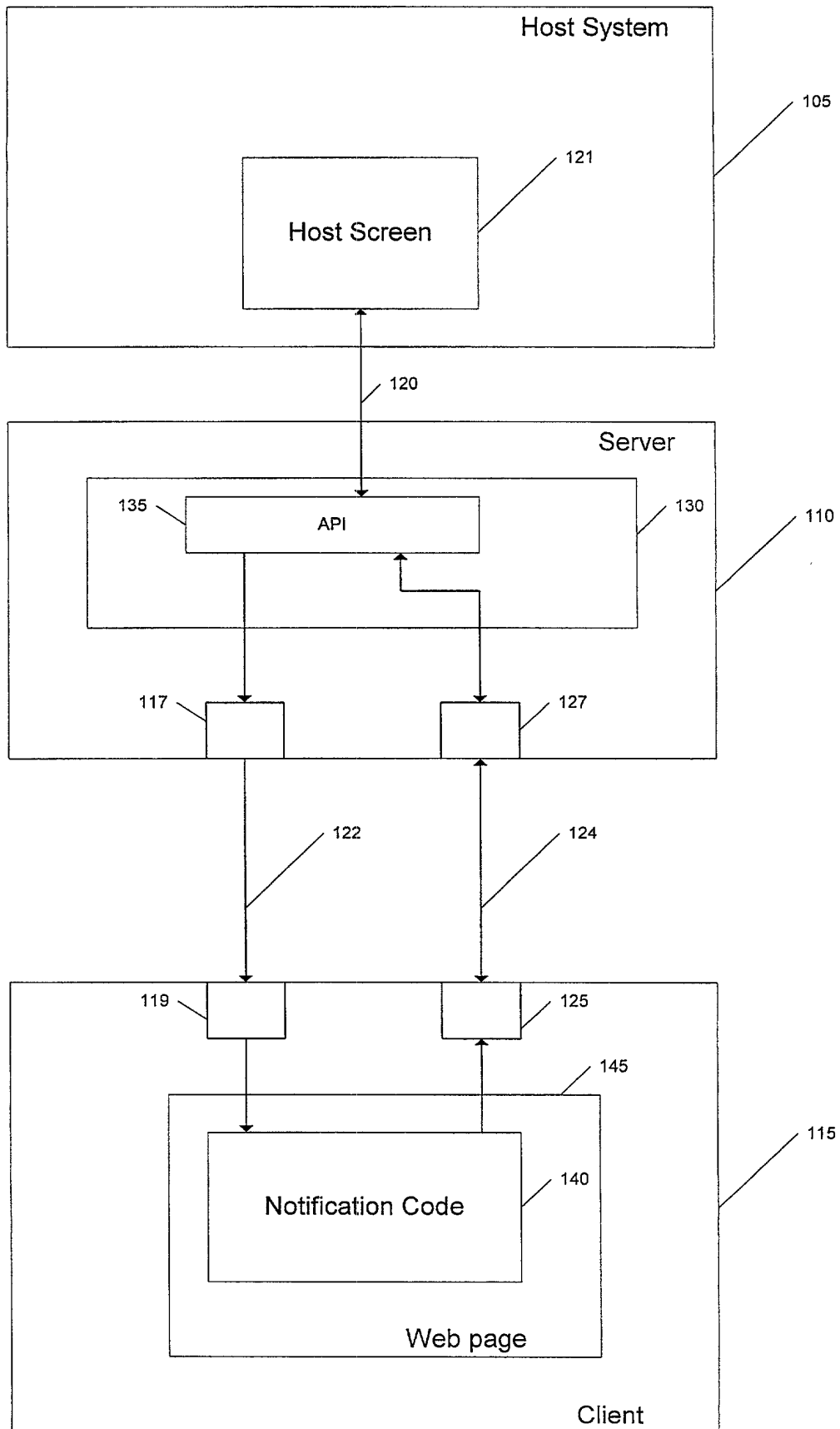
650760 "9294660



**METHODS, SYSTEMS, AND COMPUTER PROGRAM PRODUCTS THAT  
REQUEST UPDATED HOST SCREEN INFORMATION FROM HOST  
SYSTEMS IN RESPONSE TO NOTIFICATION BY SERVERS**

**Abstract of the Disclosure**

A method of providing updated host screen information to a client application utilizing a request-response communications model includes establishing a first connection between the client application and a server application, wherein the server application provides updated host screen information to the client application in response to requests from the client application. A second connection is established between a monitor application and the server application. A notification of the availability of updated host screen information is received via the second connection at the monitor application. The updated host screen information is requested over the first connection responsive to receiving the notification. The requested updated host screen information is received at the client application and displaying utilizing the client application. Related systems and computer program products are also disclosed.



**FIG. 1**

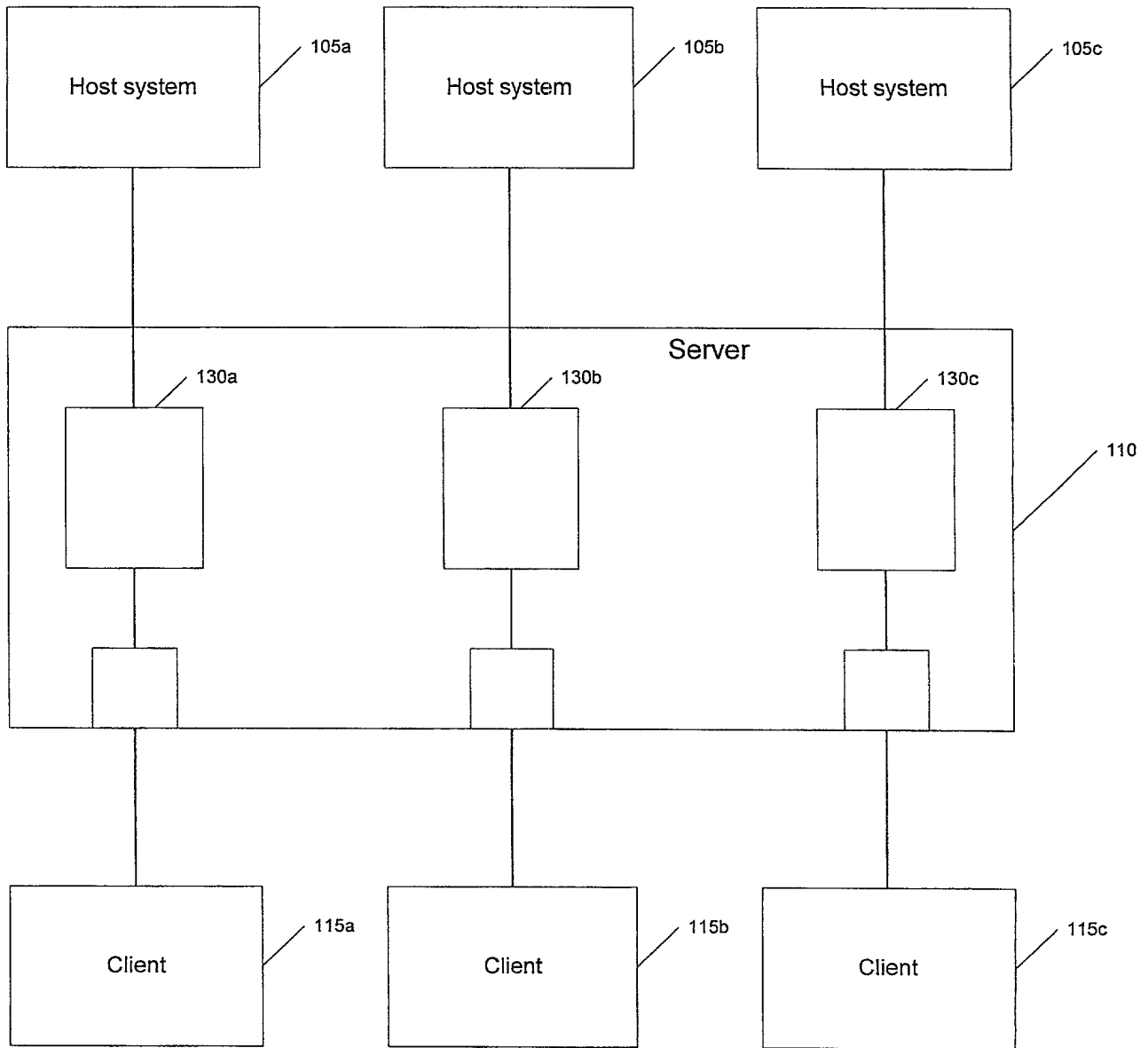
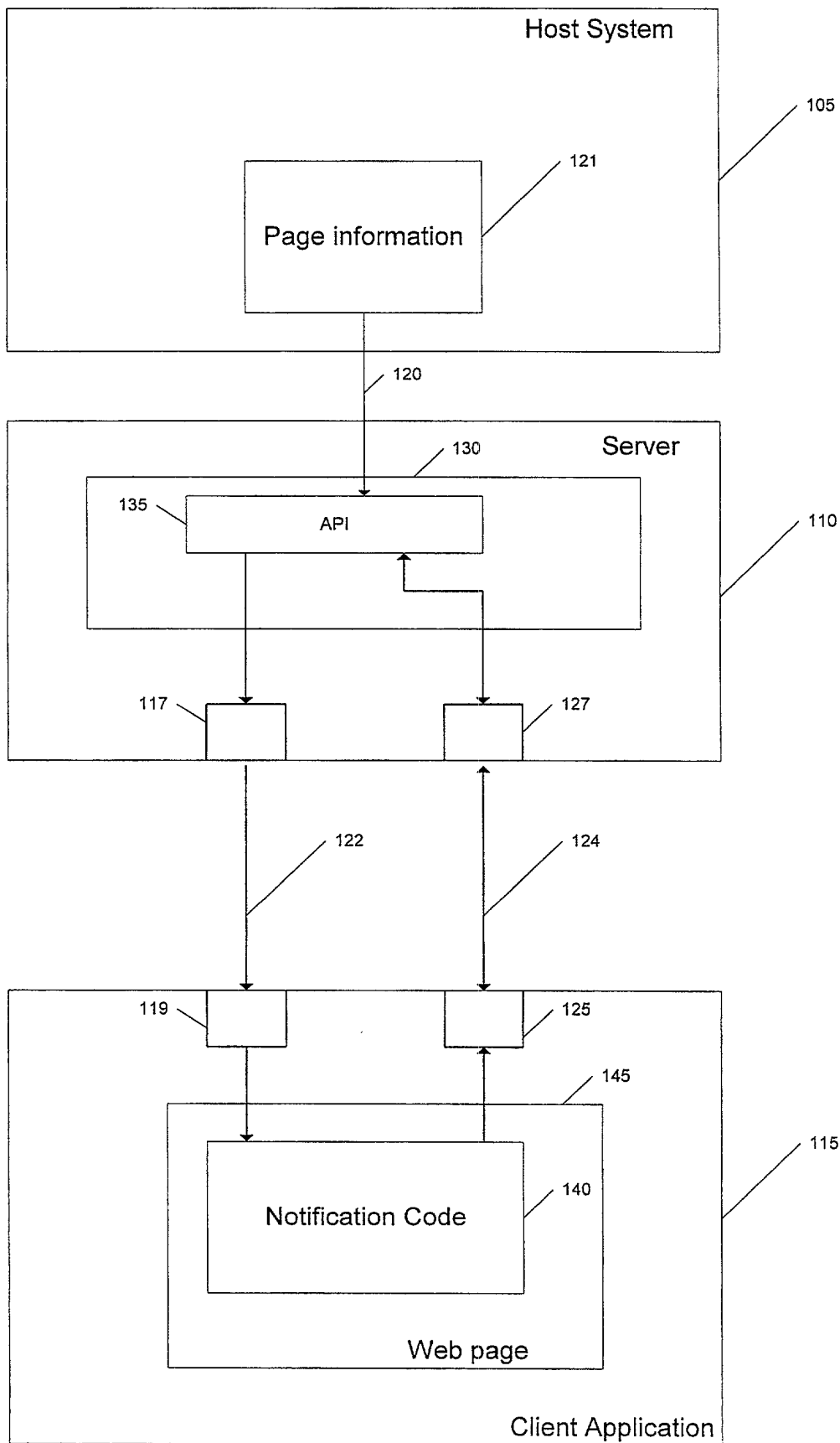
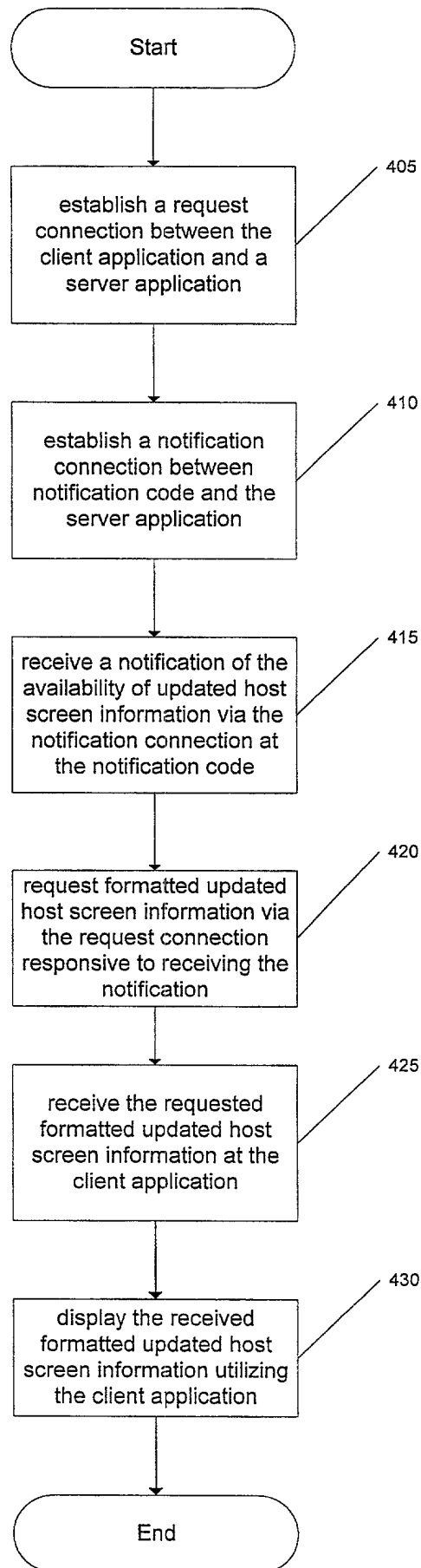


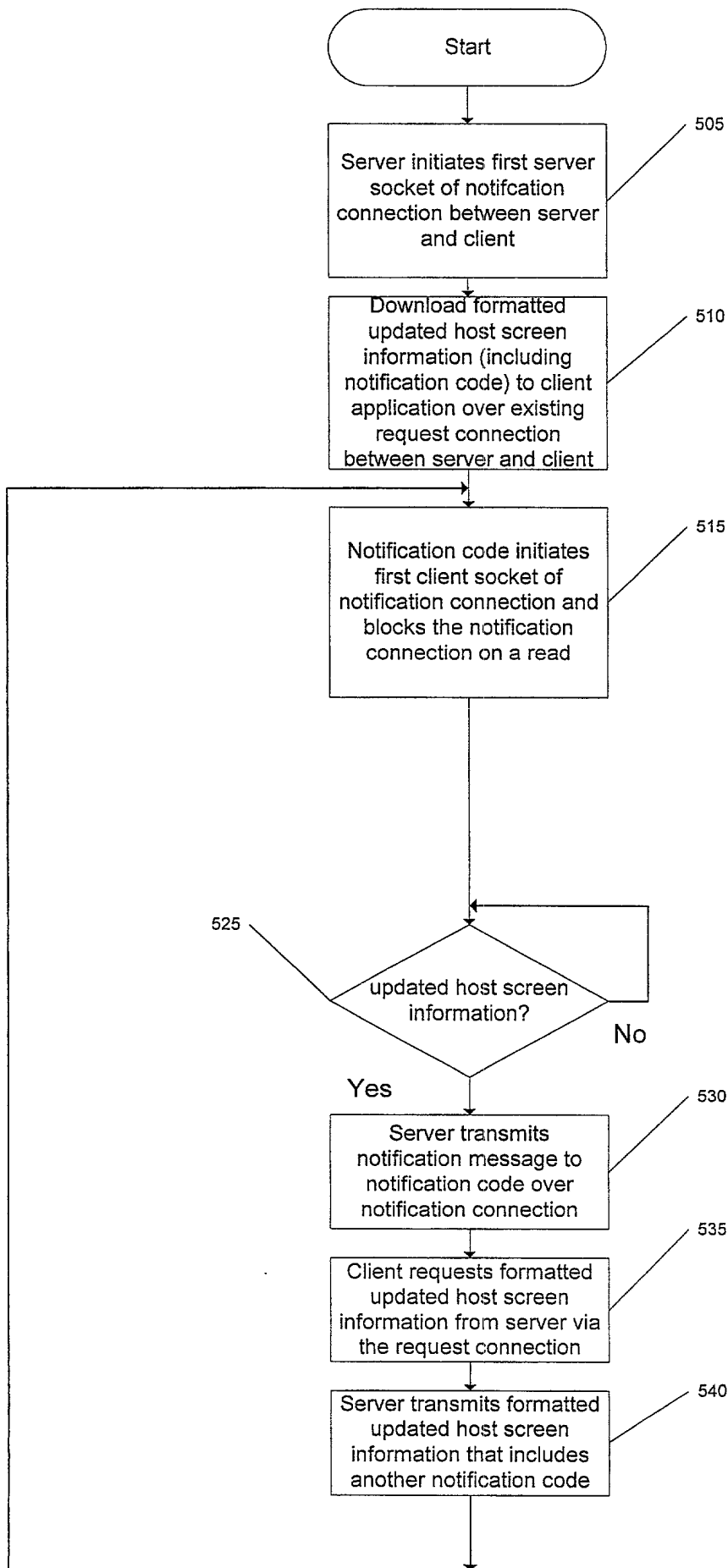
FIG. 2



**FIG. 3**



**FIG. 4**



**FIG. 5**

## File Distribute Inquire Options Help

200

## Search Results

For a record, press a function key -or- type an Action Code and press Enter.

A=Address B=Backup C=CC-list E=Dept title F=Feedback  
 I=Show Ids J=JobResp(1pers) K=Calendar L=Local data O=Update/Open  
 P=Phones R=Rpts-To-All T=To-list U=Rpts-Chain V=View record

Lines 7 to 12 of 185  
 Columns 50 to 81 of 157

ASSIGNEE RTP WASHA07

Name	EmpSt	Tie-line	Node
Li, Michael C.T.	Reg	4095	IBMUSM
Li, Ruey-Feng	Mgr	5030	IBMUSM
Li, Shuping *CONTRACTOR*	Contr	5937	
Li, Yi *CONTRACTOR*	Contr	4904	IBMUSM
Li, Yongcheng	Reg	2693	IBMUSM
Li, Yunlong	Reg	2172	IBMUSM

Command ==&gt;

F1=Help F2=Set 2 F3=Exit F4=Send note F5=Rpts-To-All F6=Show dept/team  
 F7=Backward F8=Forward F9=JobResp(all) F10=Actions F11=Dist list  
 F12=Cancel

FIG. 6

File	Distribute	Inquire	Options	Help
200 Search Results				
For a record, press a function key -or- type an Action Code and press Enter A=Address B=Backup C=CC-list E=Dept title F=Feedback I=Show Ids J=JobResp(lpers) K=Calendar L=Local data O=Update/Open P=Phones R=Rpts-To-All T=To-List U=Rpts-Chain V=View record				
Lines 7 to 12 of 14				
Columns 34 to 81 of 141				
ASSIGNEE RTP WASHA07				
Name	Act	EmpSt	Tie-line Node	User ID External-Phone
Li, Michael C T		Reg	IBMUSN37 MCLI	4095
Li, Ruey-Feng		Mgr	IBMUSN21 RLIO	5030
Li, Shuping *CONTRACTOR*		Contr		5937
Li, Xiaobo		Reg	IBMUSN38 LIX	2441
Li, Yi *CONTRACTOR*		Contr	IBMUSN27 YILI	4904
Li, Yongcheng		Reg	IBMUSN21 YCLI	2693
Command ==>				
F1=Help F2=Set 2 F3=Exit F4=Send note F5=Rpts-To-All F6=Show dept/team F7=Backward F8=Forward F9=JobResp(all) F10=Actions F11=Dist List F12=Cancel				

FIG. 7



# DECLARATION AND POWER OF ATTORNEY FOR PATENT APPLICATION

Attorney Docket No. 5577-177

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled **METHODS, SYSTEMS, AND COMPUTER PROGRAM PRODUCTS THAT REQUEST UPDATED HOST SCREEN INFORMATION FROM HOST SYSTEMS IN RESPONSE TO NOTIFICATION BY SERVERS,**

the specification of which

☒ is attached hereto

OR

☐ was filed on \_\_\_\_\_ as United States Application No. \_\_\_\_\_ or PCT International Application Number \_\_\_\_\_ and was amended on \_\_\_\_\_ (if applicable).

I hereby state that I have reviewed and understand the contents of the above-identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in Title 37 Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, § 119(a)-(d) or § 365(b) of any foreign application(s) for patent or inventor's certificate, or § 365(a) of any PCT International application which designated at least one country other than the United States of America, listed below and have also identified below any foreign application for patent or inventor's certificate, or of any PCT International application having a filing date before that of the application on which priority is claimed.

None			<input type="checkbox"/> Yes <input type="checkbox"/> No
Number	Country	MM/DD/YYYY Filed	Priority Claimed
			<input type="checkbox"/> Yes <input type="checkbox"/> No
Number	Country	MM/DD/YYYY Filed	Priority Claimed
			<input type="checkbox"/> Yes <input type="checkbox"/> No
Number	Country	MM/DD/YYYY Filed	Priority Claimed

I hereby claim the benefit under Title 35, United States Code, § 119(e) of any United States provisional application(s) listed below.

None	
Application Number(s)	Filing Date (MM/DD/YYYY)

Application Number(s)	Filing Date (MM/DD/YYYY)

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) or § 365(c) of any PCT international application designating the United States of America, listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States or PCT International application(s) in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information which is material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application (37 C.F.R. § 1.63(d)).

None		
Appln. Serial No.	Filing Date	Status Patented/Pending/Abandoned

Appln. Serial No.	Filing Date	Status Patented/Pending/Abandoned

Appln. Serial No.	Filing Date	Status Patented/Pending/Abandoned

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

600760 "SECRET"

POWER OF ATTORNEY: As a named inventor, I hereby appoint the following registered attorney(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith.

A. Bruce Clay  
Registration No. 32,121

Edward H. Duffield  
Registration No. 25,970

Gregory M. Doudnikoff  
Registration No. 32,847

Jerry W. Herndon  
Registration No. 27,901

Jeanine S. Ray-Yarletts  
Registration No. 39,808

Mitchell S. Bigel  
Registration No. 29,614

Timothy J. O'Sullivan  
Registration No. 35,632

Robert N. Crouse  
Registration No. P-44,635

Send correspondence to:

USPTO Customer No. 20792  
Robert N. Crouse  
Myers Bigel Sibley & Sajovec, P.A.  
Post Office Drawer 37428  
Raleigh, North Carolina 27627

Direct telephone calls to:

Robert N. Crouse  
(919) 854-1400

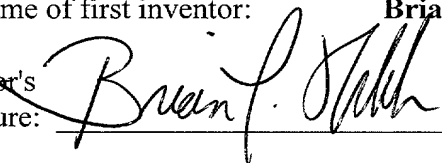
Facsimile:

(919) 854-1401

Full name of first inventor:

**Brian T. Webb**

Inventor's  
Signature:

 Date: 9/7/1999

Residence:

Raleigh, North Carolina

Citizenship:

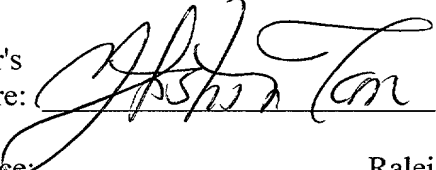
United States of America

Post Office Address:

4608 Pine Trace Drive  
Raleigh, North Carolina 27613

Full name of second inventor: **Yih-Shin Tan**

Inventor's

Signature:  Date: 9/8/99


Residence: Raleigh, North Carolina

Citizenship: United States of America

Post Office Address: 300 Gretton Place  
Raleigh, North Carolina 27615

650760" 925766.60

Full name of third inventor: **Yongcheng Li**

Inventor's  
Signature:  Date: 9/8/1999

Residence: Raleigh, North Carolina

Citizenship: People's Republic of China

Post Office Address: 107 Olde Tree Drive  
Raleigh, North Carolina 27606

Full name of fourth inventor: **David B. Gilgen**

Inventor's  
Signature: David B. Gilgen Date: 7/8/1999

Residence: Raleigh, North Carolina

Citizenship: United States of America

Post Office Address: 5112 Birchleaf Drive  
Raleigh, North Carolina 27606

Full name of fifth inventor:

**James M. Mathewson, II**

Inventor's

Signature:

James M. Mathewson II

Date:

09/08/1999

Residence:

Chapel Hill, North Carolina

Citizenship:

United States of America

Post Office Address:

6601 Manor Hill Court  
Chapel Hill, North Carolina 27516

Full name of sixth inventor: **Michael Srihari**

Inventor's  
Signature: Michael Srihari Date: 9/8/99

Residence: Thornwood, New York

Citizenship: United States of America

Post Office Address: 70 Richard Lane  
Thornwood, New York 10594